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The Nannochoristidae of South America (Mecoptera)<sup>1</sup>

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ABSTRACT

The family Nannochoristidae is briefly characterized. *Nannochorista andina*, new species, is described and illustrated. The other South American species, *N. neotropica* Navás and *N. edwardsi* Kimmins, are briefly characterized and illustrated; and all are included in a taxonomic key. Biogeography of the family is discussed.

INTRODUCTION

Among the Mecoptera, the Nannochoristidae are unusual or unique in several respects. They have elongate, aquatic larvae (Pilgrim, 1972), while those of other Mecoptera are eruciform or somewhat scarabaeiform and terrestrial. The mandibles of adults are relatively broad, subtriangular and acutely tipped, yet they do not reach the end of the rostrum, so that their function in feeding is not easy to hypothesize and remains unknown. In labial structure, particularly the expanded apical segments of the labial palps, nannochoristids are remarkably like some nematocerous Diptera and unlike other Mecoptera. At the base of the aedeagus are two large, somewhat ovoid capsules, close together or partially fused medially

depending on the species (Figs. 5, 12, 13). I have not determined the function of these parts, which are unique to Nannochoristidae. The males also have no distinct sperm pump (Willmann, 1981), a characteristic they share with male Boreidae but in which they differ from other Mecoptera and from Antliophora generally. Broad fusion of the basistyles both dorsally and ventrally gives the genital segment of male nannochoristids a characteristic appearance (Figs. 6, 15, 17). Dorsal fusion of the basistyles exceeds ventral fusion in most families, but the reverse is true in Bittacidae, and there is essentially no fusion in Boreidae or Meropeidae. Mickoleit (1975) has described the terminal abdominal structure of females of *Nannochorista*, point-

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ing out the unique median separation of sternal sclerites ("gonocoxosternites") on both the eighth and ninth segments (Fig. 10). Two large setae near the bases of veins  $A_1$  and  $A_2$  on the front wing (Fig. 9) are of unknown function, though probably sensory, and I have not seen equivalent setae in other families.

The family includes the only mecopteran genus, *Nannochorista*, that occurs both in Australia (where there are half a dozen endemic genera in other families) and South America; therefore, Nannochoristidae are of particular interest to biogeographers.

Only two South American species of *Nannochorista* have been named: *N. neotropica* Navás (1929) and *N. edwardsi* Kimmins

(1929). In recent years, Dr. Oliver S. Flint, Jr., of the National Museum of Natural History, Washington, D.C., has collected numerous individuals of a third species, described below. I am indebted to Dr. Flint for his persistent efforts to collect Mecoptera in connection with his own field work on the neotropical Trichoptera.

In the lists of specimens examined of each species, the sequence of data is as follows: country, province (in alphabetical order), locality or localities (in the language of the specimen label), elevation in meters if recorded, date, collector(s), number of males and females (m, f, in parentheses), and name of collection (in parentheses; see acknowledgments for abbreviations).

KEY TO SOUTH AMERICAN SPECIES OF NANNOCHORISTA

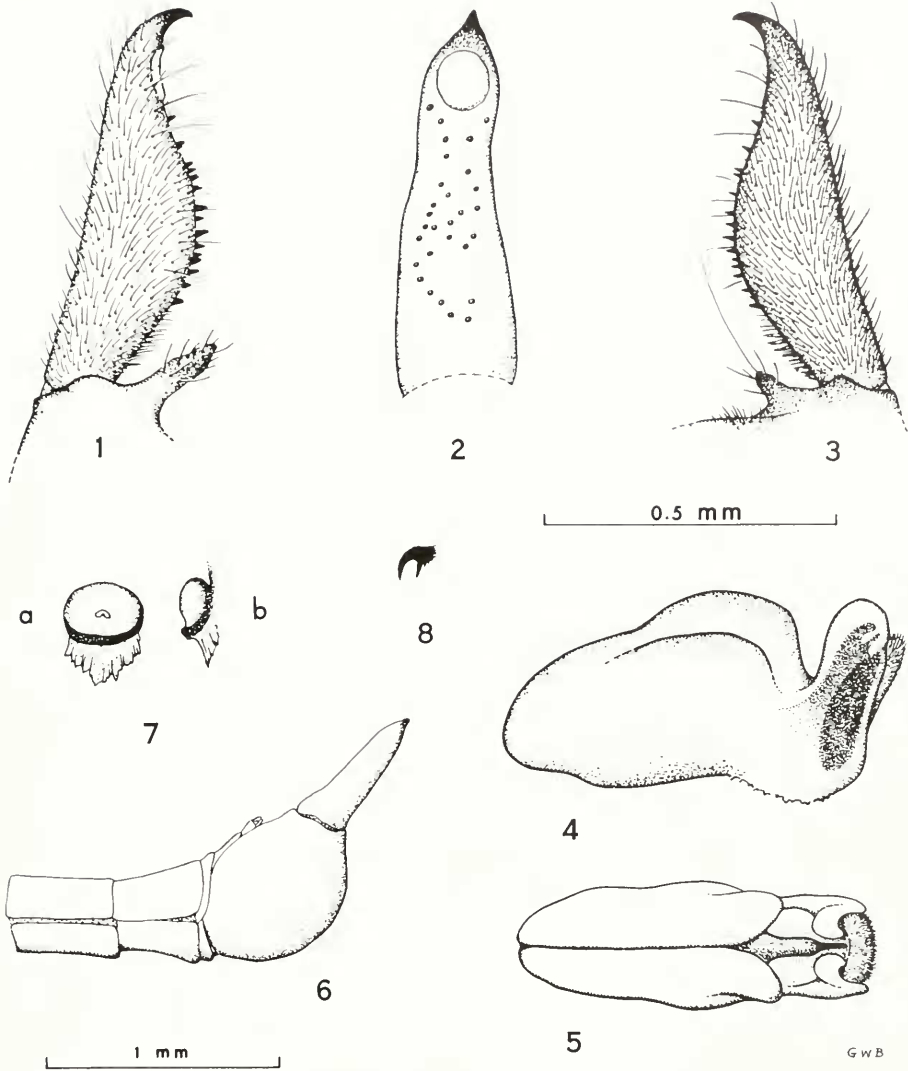
- 1. Front wings 8.8-12.2 mm long (males smaller than females), darkly tinged with yellowish brown; in male, abdominal tergum 11 terminating well before posterodorsal margin of fused basistyles (Fig. 11), dorsal and ventral projections from posteromesal edges of approximately equal length (Figs. 11, 15) . . . . . *neotropica* Navás
- Front wings 6.2-9.2 mm. long, only faintly tinged with yellowish brown; in male, abdominal tergum 11 terminating at or beyond posterodorsal margin of fused basistyles (Figs. 12, 13), dorsal projections from basistyles twice as long as ventral projections, or longer (Figs. 1, 3) . . . . . 2
- 2. Dark spots or borders often present along cross-veins in basal half of wing; in male, dorsal apical notch between basistyles broadly U-shaped, with only tips of capsules of aedeagal base visible (Fig. 12); in female, sclerites of abdominal sternum 8 twice as wide subapically as at mid-length, and sclerites of sternum 9 contiguous . . . . . *edwardsi* Kimmins
- No dark spots or borders along cross-veins; in male, dorsal apical notch between basistyles broadly V-shaped, with paired capsules of aedeagal base conspicuously exposed (Fig. 13); in female, sclerites of abdominal sternum 8 only slightly wider subapically than at mid-length, and sclerites of sternum 9 distinctly separated (Fig. 10) . . . . . *andina*, new species

*Nannochorista andina*, new species

Description based on 44 males, 12 females, pinned.

*Head:* Vertex, occiput and upper frons dark gray, with fine, short pilosity, slightly paler brown adjacent to eyes. Lower frons and clypeus dull dark yellowish brown to grayish brown. Eyes dull dark red (holotype) to blackish brown. Ocelli amber, on low, blackish brown prominence. Rostrum slightly shorter than diameter of eye in frontal aspect, abruptly narrowed near mid-

length, darkened, slender and sharp at apex. Maxillary palps brown; labial palps blackish. Anterior tentorial pit at each side of rostral base deep, circular. Antennal scape wider than long, dull yellowish brown; pedicel ovoid, dark yellowish brown to gray; basal flagellomere less than half diameter of pedicel, nearly three times length of second flagellomere; 23-26 flagellomeres in male (holotype 25), 24-25 in female. Flagellum dull yellowish brown in basal one-fifth to one-fourth, grading into dark gray apically; most flagellomeres four times as long as their diame-



Figs. 1-8. *Nannochorista andina*, n. sp. 1. Right dististyle, male paratype, dorsal aspect. 2. Right dististyle, mesal aspect, showing distribution of denticles. 3. Right dististyle, ventral aspect. 4. Aedeagus, left lateral aspect. 5. Aedeagus, dorsal aspect. 6. Terminal abdominal segments, male paratype, left lateral aspect. 7. Genital plate of female paratype, ventral (a) and right lateral (b) aspects. 8. Pretarsal claw. Upper scale: figs. 1-5, 7; lower scale: fig. 6.

ters, with hairs about as long as diameter of respective flagellomeres. Length of antennae about 4.5 mm. in male, 3.9 mm. in female.

**Thorax:** Pronotum short, transverse, dark grayish brown except narrowly sordid yellowish brown at sides and on slightly raised posterior margin; no conspicuous setae. Mesoscutum brown with short, yellowish setae and fine grayish

pubescence; irregular, shiny spot adjacent to wing base and short, longitudinal spot nearer mid-line, both resulting from absence of pubescence. Scutellum with few setae on each side curved toward mid-line. Metathoracic dorsum generally like mesothoracic. Pleural surfaces and coxae unevenly dull brown to grayish brown with fine, light gray pilosity; hairs longer on anterior

surfaces of coxae. Legs and tarsi dark yellowish brown with short, pale hairs and larger, black setae. Two tibial spurs at ventral apex of tibia, with comb of dark amber setae extending from one spur over dorsal curvature of tibia to other spur; length of spurs approximately equal to diameter of slightly expanded apex of tibia. Tibiae slightly longer than femora. Basitarsi longer than other tarsomeres together (proportions of hind tarsomeres, holotype, 60:20:12:10:7). Pretarsal claws each with one large basal tooth about as long as claw (Fig. 8).

*Wings* (Fig. 9) lightly tinged with grayish brown in male, more darkly tinged in female, without spots or darkening along veins; membrane iridescent; stigmal area scarcely darker than rest of membrane. Veins brown, with pale thyridia at first fork of M, on cross-vein between  $Cu_2$  and  $A_1$  in front wing and on cross-vein between  $Cu_1$  and  $Cu_2$  near origin of M in hind wing. Vein  $Cu_2$  paler and more slender than other veins, very weak in hind wings. In front wing,  $R_1$  arched toward C, nearly touching Sc or fused with Sc for short distance before latter turns diagonally toward costal margin. Sc bent slightly toward C at costal cross-vein a little before level of origin of Rs. Cell 1st  $R_4$  relatively shorter than in other species; basal section of  $R_4$  equal to or shorter than adjoining section of  $R_{4+5}$ . Wing length, male, 6.2-7.2 mm. (holotype 6.5 mm.); female, 7.6-9.2 mm. (allotype 8.1 mm.)

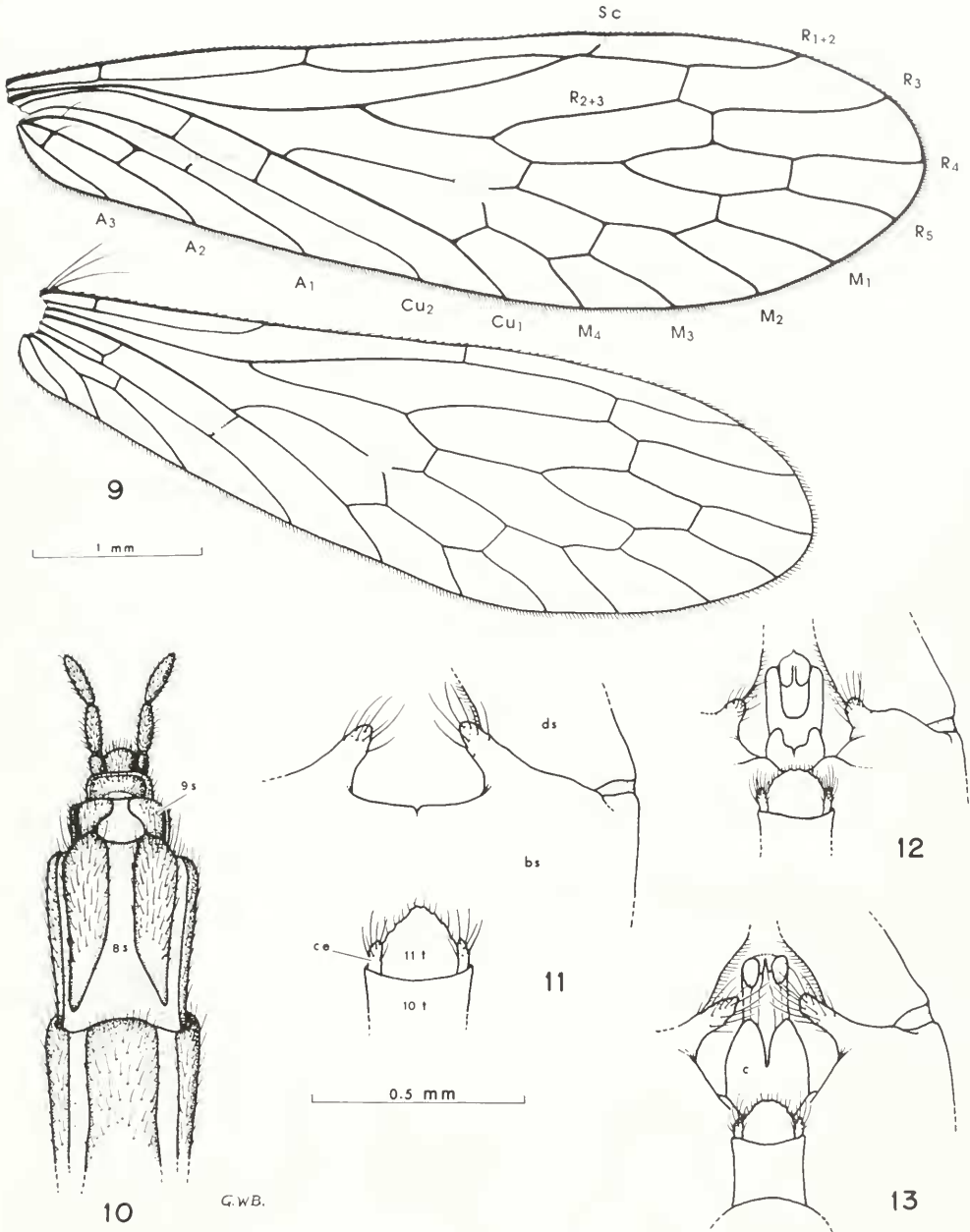
*Abdomen of male:* Terga and sterna of segments 1-8 dark blackish brown, glossy, with sparse short, pale hairs. Terga 9 and 10 brown, 11 dark yellowish brown. Segment 8 very short. Basistyles and dististyles of abruptly enlarged ninth (genital) segment contrastingly colored yellowish brown. Tenth tergum less than half as wide as ninth, truncate to slightly emarginate apically. Cerci short, barely projecting at each side of tergum 11. Basistyles only shallowly separated dorsally, almost totally fused ventrally (Fig. 13), with short projection near inner base of each dististyle both dorsally and ventrally. Dististyles (Figs. 1, 2, 3) somewhat expanded near mid-length, with densely sclerotized, hook-like apex and approximately 30 blackened denticles on mesal surface; a circular, membranous stylar organ also on mesal surface slightly before apex. Aedeagus (Figs. 4, 5) arising from pair of contiguous, sclerotized but pale yellowish brown capsules, projecting backward between posterior extensions from these capsules, then turning dorsad in anterodorsal channel in finely pubescent median lobe. Proctiger (segments 10-11) extending to mid-dorsal margin of fused basistyles.

*Abdomen of female:* Segments 2-8 slightly compressed, tapering evenly toward apex; segments 9-11 abruptly smaller than 8, with 10 and 11 mostly recessed into ninth segment in dried specimens. Terga and sterna 1-7 unevenly dark brown to blackish brown, glossy, with sparse, short pale hairs. Pleural membrane paler brown.

Terga 8-10 nearly black; segment 11 and cerci brown. Sterna narrow, four to five times as long as wide; sternum 6 with medial anterior notch. Eighth sternum (subgenital plate; Gonocoxit 8 of Mickoleit) completely divided by membranous zone along mid-line (Fig. 10), extending backward beyond end of tergum 8 and beneath ninth segment. Sclerites of ninth sternum also wholly separated by membrane. Tenth sternum short, undivided. Segment 11 lightly sclerotized. Cerci three-segmented, basal segments immovably fused to sides of segment 11. Genital plate (medigynium) an oval, sclerotized pad surrounding opening of spermathecal duct (Fig. 7).

Body length, male, about 5.2-7.0 mm. (holotype 5.7 mm.); female, about 7.5-8.2 mm. (allotype 7.5 mm.).

*Types:* Holotype, male, Argentina, Neuquén, Río Totoral, 24 km. NW of Villa La Angostura, 20 February 1978, C. M. and O. S. Flint, Jr. Allotype, Argentina, Neuquén, Río Nonthue, Estacion Forestal, Pucará, 24 February 1978, C. M. and O. S. Flint, Jr. Paratypes: ARGENTINA, NEUQUÉN: Arroyo Rosales, near San Martin de los Andes, 22 Jan. 1974, O. S. Flint, Jr. (10 m.); Arroyo Culebra, 20 km. S of San Martin de los Andes (40°18'S, 71°23'W), 2 Feb. 1974, O. S. Flint, Jr. (7 m., 1 f.); Canal, Estacion Forestal, Pucará (40°09'S, 71°39'W), 28-29 Jan. 1974, O. S. Flint, Jr. (2 f.); 5 km. SE of Lago Huechulafquen (39°46'S, 71°28'W), 26 Jan. 1974, O. S. Flint, Jr. (1 m.); Lago Nonthue, 12 Sept. 1951, "Schovskoy" (probably L. Schajovskoi) (1 f.); Los Totoros, 23 km. NW of Villa La Angostura, 20 Feb. 1978, C. M. and O. S. Flint, Jr. (1 m.); Río Totoral, 23 km. NW of Villa La Angostura, 31 Jan. 1987, C. M. and O. S. Flint, Jr. (1 m.); Río Bonito, SE of Villa La Angostura, 21 Feb. 1978, C. M. and O. S. Flint, Jr. (1 m.); Río Nonthue, Estacion Forestal, Pucará, (40°09'S, 71°39'W), 24 Feb. 1978, C. M. and O. S. Flint, Jr. (3 m.); Yuco, W of San Martin de los Andes, 23 Feb. 1978, C. M. and O. S. Flint, Jr. (1 m.). RÍO NEGRO: 5 km. S of Río Villegas (41°34'S, 71°32'W), 7 Feb. 1974, O. S. Flint, Jr. (1 m., 1 f.). CHILE. ARAUCO: Elicura, Contulmo, 28 Dec. 1985, L. E. Peña (1 m., 1 f.); CHILOE: Isla Chiloe, Ahoni Alto, SE of Chonchi, 22-23 Feb. 1988, L. E. Peña (4 m.); Dalcahue, 21-23 Oct. 1969, O. S. Flint and G. Barria (1 m.); Pio-Pio, 15 km. NW of Queilén, 10-11 March 1987, L. E. Peña (1 m.); Piruquina (near Castro), 15 March 1987, L. E. Peña (2 f.); Río Butalcura, 21 Oct. 1969, O. S. Flint and G. Barria (1 m.); PALENA: Termas Amarillo, about 30 km. SE of Chaitén, 250 m., 22 Jan. 1987, C. M. and O. S. Flint, Jr. (6 m., 1 f.); NUBLE: Las Trancas, 21 km. E of Recinto, 1300 m., near high waterfall, 17 Jan. 1979, M. and D. Davis and B. Akerbergs (1 m.; 1 f.); MALLECO: Contulmo National Park, 19 Oct. 1969, O. S. Flint and G. Barria (1 f.); Nahuelbuta National Park, near Los Gringos Camp, 29 Jan.-5 Feb. 1979, M. and



Figs. 9-13. *Nannochorista* spp. 9. *N. andina*, n. sp., right wings; venation according to Comstock-Needham system. 10. *N. andina*, n. sp., terminal abdominal segments of female paratype; s - sternum. 11. *N. neotropica*, diagram of portion of genital bulb of male, to show tergum 11 ending well before margin of fused basistyles; bs - basistyle, ce - cercus, ds - dististyle, t - tergum. 12. *N. edwardsi*, diagram of portion of genital bulb of male, showing tergum 11 ending at margin of fused basistyles. 13. *N. andina*, n. sp., diagram of portion of genital bulb of male, showing tergum 11 extending slightly beyond margin of fused basistyles; c - capsule at base of aedeagus. Upper scale: fig. 9; lower scale: figs. 10-13.

D. Davis and B. Akerbergs (1 m.).

Holotype, allotype and most paratypes are in the National Museum of Natural History, Washington, D.C.; 3 male and 1 female paratypes in Snow Entomological Museum, University of Kansas, Lawrence.

*Nannochorista andina* closely resembles *N. edwardsi* in both size and color, and the two species have rather broadly overlapping ranges. The smoky-gray maculations along certain cross-veins in *edwardsi*, as described by Kimmins (1929), would appear to make differentiation of these species easy, but these spots are absent in many individuals of *edwardsi* identified on the basis of external genital structures. Males are readily recognized by the aedeagal structure: in *andina* the basal capsules are broadly exposed in the relatively deep notch between the basistyles (Fig. 13), while in *edwardsi* only the tips of the capsules are exposed, the basistyles being more completely fused (Fig. 12). Females may be differentiated by the shapes of the sternal sclerites of abdominal segments 8 and 9 (see key).

#### *Nannochorista edwardsi* Kimmins, 1929

Clearly, this species and *N. andina* comprise a distinct group within *Nannochorista*. The length of abdominal segments 10 and 11 in relation to the posterodorsal margin of the fused basistyles (Figs. 12, 13) is unlike the condition seen in males of all other species in the family. In such a small genus, however, subgeneric recognition of this difference seems unnecessary. *N. edwardsi* and *N. andina* are very similar in size, color of body and wings, number of antennal flagellomeres and various other details.

Males of these species are easily differentiated by the shape of the space between the posterodorsal projections from the basistyles. As indicated in the key, this space, or notch, is broadly U-shaped in *edwardsi*. Only the apical one-third to one-half of the basal capsules of the aedeagus projects from beneath the median margin of the fused basistyles (Fig. 12). These basal capsules have somewhat pointed posterior apices in the male holotype but are usually more rounded apically, as illustrated here. The dorsal projections from the basistyles are only about as long as their basal width, while the ventral ones are much smaller in all dimensions.

Kimmins (1929:191) illustrated the wing of a female paratype, showing all cross-veins distinctly bordered by "blackish" pigmentation, as well as spots at the origin of Rs and M. This is a highly variable character, and if one may rely on the described differences in genitalia (as above and in the key), there are numerous individuals of this

species with no wing maculations whatsoever. The male holotype shows no pigmentation along most cross-veins in the apical half of the wing (Fig. 16).

The male holotype and female paratype were examined at the British Museum (Natural History). The holotype is intact in every respect. Its locality-date label reads "L. Gutierrez, 3-14-xi-1926." This lake is just south of large Lake Nahuel Huapi and west of San Carlos de Bariloche (see Map 1).

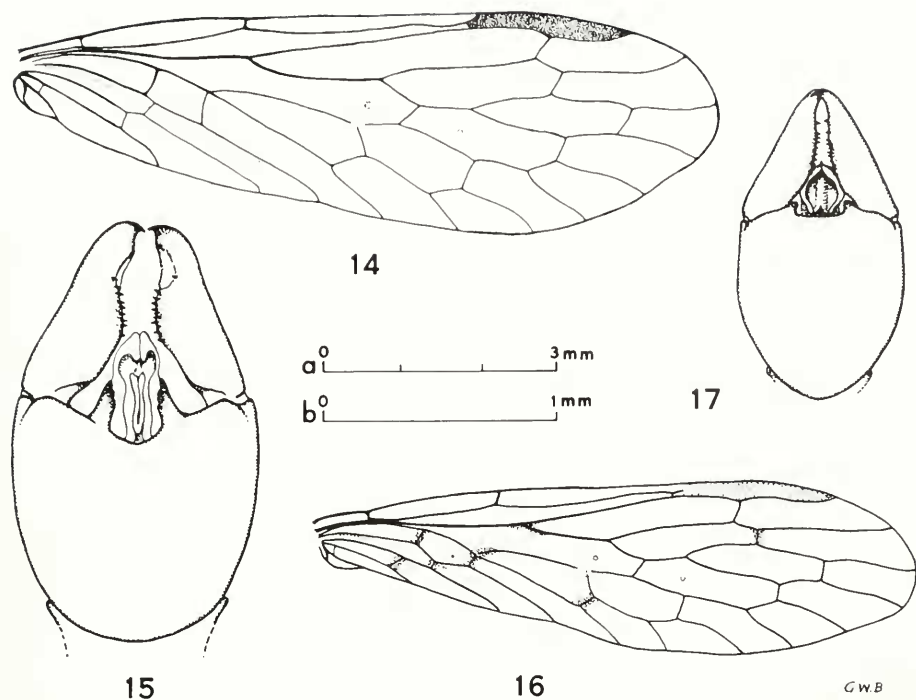
*Specimens examined.* ARGENTINA. NEUQUÉN: Pucará, Parque Nacional Lanín, - Dec. 1952, L. Schajovskoi (1 m.) (FMC); Lake Correntoso, 18-25 Nov. 1926, F. & M. Edwards (2 m.) (BMNH). RÍO NEGRO: Bariloche (San Carlos de Bariloche), 3 Nov. 1926 (1 m.) and 28 Nov. 1926 (1 f.), F. & M. Edwards (BMNH); Lake Gutierrez, 3-14 Nov. 1926, F. W. Edwards (1 m., holotype) (BMNH). CHILE. ARAUCO: San Alfonso above Caranávida, 16-17 Oct. 1969, O. S. Flint & G. Barria (7 m.) (USNM). AYSEN: Puerto Cisnes, - Feb. 1961, Luis Peña (1 f.) (KU). CHILOE: Isla Chiloe, Castro, 20-22 Nov. 1926, F. & M. Edwards (1 m.) (BMNH); Isla Chiloe, Dalcahue, 21-23 Oct. 1969, Flint & Barria (1 m., 3 f., 1 without abdomen) (USNM). OSORNO: Puyehue National Park, Paso Puyehue, 1360 m., 13 Feb. 1978, C. M. & O. S. Flint (1 m.) (USNM); Río Golgol, Cordillera Osorno, 300-400 m., 13-19 Mar. 1955, Luis E. Peña (1 f.) (KU); Río Changlefu, Puyehue, 250 m., 21 Nov. 1963, G. F. Edmunds no. 22 (1 f.) (Edmunds collection).

#### *Nannochorista neotropica* Navás, 1929

This is a relatively large *Nannochorista* (fore wing about 9-12 mm. long, compared to 6-9 mm. in other regional species). In fact, it is the largest known member of its family. It is readily recognized also by the amber or dark yellowish brown color of the wings. There is a conspicuous whitish thyridium at the first fork of the media (Fig. 14), and two easily noticeable nygmata (small, clear, circular thin spots in the wing membrane) occur in cells R and first  $R_5$ , with a less conspicuous one in cell second  $Cu_1$  near the base of the wing.

In the male, abdominal segments 10 and 11 are relatively short and the dorsal notch between the basistyles quite shallow, so that the apex of tergum 11 is far short of the margins of the basistyles (Fig. 11). This is the condition in all the Australian *Nannochoristas*, as well, and in the single species of *Microchorista* in New Zealand. It differs strikingly, however, from the condition in *N. edwardsi* and *N. andina*.

Also in the male, there is a finger-like projection from the posterior margin of each basistyle,



Figs. 14-17. *Nannochorista* spp. 14. *N. neotropica*, right front wing, male holotype. 15. *N. neotropica*, genital bulb, male holotype, ventral aspect. 16. *N. edwardsi*, right front wing, male holotype. 17. *N. edwardsi*, genital bulb, male holotype, ventral aspect. Scales: a - figs. 14, 16, b - figs. 15, 17.

near the mid-line. In a corresponding position on the posteroventral margin of the basistyle there is an equally long, more densely sclerotized projection (Fig. 15). The ventral projections are somewhat flattened and blade-like, with the inner (mesal) edge more ventral than the outer edge. A tongue-like appendage of the aedeagus is usually visible between the two ventral projections.

The holotype, in the Museum National d'Histoire Naturelle, Paris, is a male that is generally intact and clean. It lacks the left front and left middle tarsi and parts of the left hind and right front tarsi and the right antenna beyond the 16th flagellomere. The type specimen is labelled "Perales (Chile)," which is probably Los Perales, about 40 km. southeast of Valparaíso. The locality is the headwaters of Río Marga, which is probably why Navás gave the type locality as "Marga-Marga."

*Specimens examined.* ARGENTINA. NEUQUÉN: Río Nonthue, Est. For. Pucará, 24 Feb. 1978, C. M. & O. S. Flint (8 m., 3 f.) (USNM); Pucará, Parque Nacional Lanín, - Nov. 1951 (1 f.), - Dec. 1951 (1 f.), 15 Feb. 1953 (1 m.), L. Schajovskoi (FMC). CHILE. ARAUCO: Caramávida, 17-19 Oct. 1969, O. S. Flint & G. Barria (1 m.); San Alfonso, above Caramávida, 16-17 Oct. 1969, Flint & Barria (1 f.) (both USNM). CAUTÍN: Fundo el Coigue, 500 m., about 29 km. NE of Villarica, 28 Feb. - 3 Mar. 1979, M. & D. Davis & B. Akerbergs (1 m., 1 f.) (USNM). CHILOE: Isla Chiloe, Dalcahue, 21-23 Oct. 1969, Flint & Barria (1 m., 1 f.) (USNM). LLANQUIHUE: Hornohuínco, 300 m., 11 km. SW of Lago Chapo, 29-31 Dec. 1981, D. R. Davis (1 m.) (USNM). MAGELLANES: Tierra del Fuego, Rusfin, 17-20 Nov. 1960, Luis E. Peña (1 m.) (KU). MAULE: Tregualemu, 600 m., 27 Jan. 1979, Luis E. Peña (1 f.) (USNM). ÑUBLE: Recinto, 4-6 Mar. 1968, O. Flint & L.

Peña (4 m., 1 f.); Las Trancas, 1300 m., 21 km. E of Recinto, near high waterfall, 17 Jan. 1979, M. & D. Davis & B. Akerbergs (1 m.); Las Trancas, 2 Mar. 1968, O. Flint & L. Peña (1 m., 2 f.); Las Trancas, Cordillera Chillan, 21-30 Nov. 1964, L. E. Peña (2 f.); Shangri-la, SW side of Volcán Chillan, 1600 m., 19-21 Jan. 1979, D. & M. Davis & B. Akerbergs (1 f.) (all USNM); Las Cabras, S. of Volcán Chillan, 1480 m., 10-23 Dec. 1954, L. E. Peña (3 m., 1 f.); same but 19-23 Dec. (1 f.); same but 8-15 Feb. 1959 (1 m.); Recinto, Cordillera Nuble, - Feb. 1953, L. E. Peña (1 m.); Las Trancas, Cordillera Chillan, 1200 m., 23-28 Feb. 1956, L. E. Peña (1 f.) (all KU). OSORNO: Puyehue National Park, 600 m., Ag. Calientes vic., D. & M. Davis & B. Akerbergs (1 f.) (USNM). TALCA: Alto de Vilches, 17-24 Oct. 1964, L. E. Peña (1 m.) (USNM). VALDIVIA: Rincon de Piedra, 30 m., about 20 km. SE of Valdivia, 24-25 Feb. 1979, D. & M. Davis & B. Akerbergs (1 m.) (USNM). VALPARAISO: Los Perales (= Perales) (headwaters of Río Marga), - Feb. 1921, Jaffuel & Pirion (1m., holotype) (Paris).

#### BIOGEOGRAPHY OF NANNOCHORISTIDAE

At present, four species of *Nannochorista* are known from southeastern Australia and three in southern South America. A single species of the closely related *Microchorista* (formerly *Choristella*) occurs on the South Island of New Zealand. This geographic distribution of the Nannochoristidae is in accord with the concept of an ancient Gondwanaland, the widespread fauna of which was fragmented as present-day land areas broke away by the process of continental drift. New Zealand having been isolated the longest, its nannochoristid species is expected to show the greatest phenetic divergence, which is the case (maculate fore

wings, cell  $R_4$  much shorter than in *Nannochorista* and not divided by a cross-vein, etc.).

Toward the close of the Triassic Period, about 180 million years ago, Australia-Antarctica is supposed to have begun to separate from South America-Africa. Since the larvae of *Nannochorista* are confined to fresh-water streams and the adults have low vagility, it is reasonable to assume that the South American and Australian ancestors of living Nannochoristas became isolated from each other at that time.

When one invokes continental drift to explain present-day distributions, it is necessary to have reason to believe that the taxa involved are old enough to have participated in the geologic events described. Although there are no fossil species of *Nannochorista*, there are some similar genera known from the upper Permian strata of eastern Australia (Riek, 1953). Wings of *Nannochoristella reducta* Riek and *Neochoristella optata* Riek, both Nannochoristidae, are among many remains of Mecoptera of various families found in sediments perhaps 260 million years old, between Belmont and Warner's Bay, New South Wales.

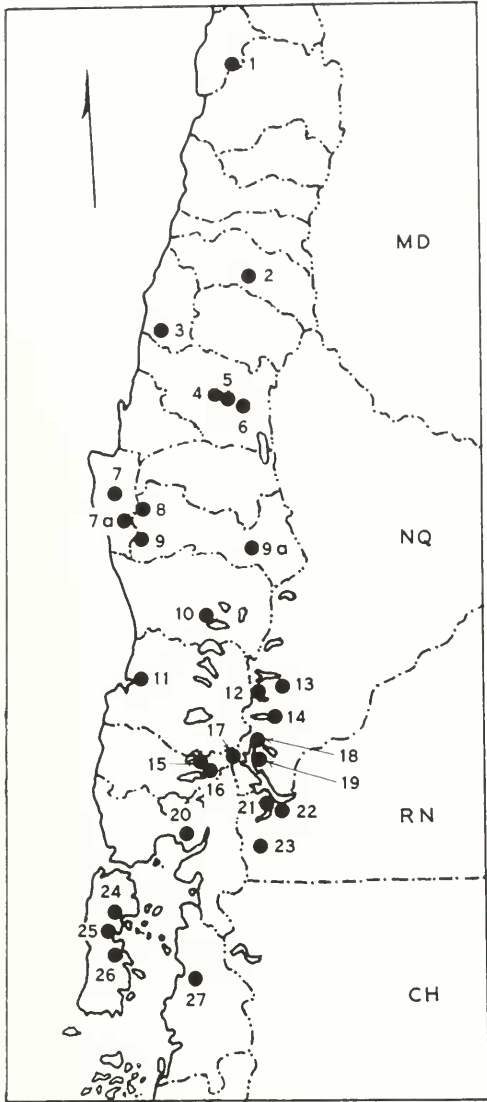
The known ranges of the three extant South American species (or, as well, the four in Australia) do not suggest where or how these species arose. All three ranges overlap broadly, that of *Nannochorista neotropica* being the most extensive. It is probable, however, that the *andina-edwardsi* group (characterized by relatively prolonged terminal abdominal segments in the male) evolved in South America during or after the Cretaceous Period.

#### ACKNOWLEDGMENTS

I am grateful to Dr. Oliver S. Flint, Jr., for collecting and making available to me most of the specimens upon which this report is based; these are in the National Museum of Natural History, Washington, D.C. (USNM). My research has been supported by the National Science Foundation, most recently through grant DEB-80-22342. I also thank Dr. Luis E. Peña of Santiago, Chile, for collecting several specimens of *Nannochorista* now in the Snow Entomological Museum, University of Kansas (KU), and Dr. F. M.

Carpenter, Museum of Comparative Zoology, Harvard University, for the loan of specimens from his collection (FMC). Dr. Edgar Riek and Dr. Courtenay Smithers kindly sent specimens of Australian species of *Nannochorista*, permitting useful comparisons. Finally, my appreciation is expressed to the curatorial staffs of the British Museum (Natural History), London (BMNH), and the Museum National d'Histoire Naturelle, Paris, for facilitating my study of type specimens and others in their care.





Map 1. Portion of Chile and adjacent Argentina from approximately 32°30'S to 44°00'S. Localities where *Nannochorista* has been found are numbered from north to south. For each, the province is named first, then the locality. Abbreviations (provinces of Argentina): CH - Chubut; MD - Mendoza; NQ - Neuquén; RN - Río Negro. Localities are given in the language of respective specimen labels, with geographic coordinates added for some.

1. Valparaíso, Los Perales, headwaters of Río Marga ("Marga Marga" in Navás, 1929).

2. Talca, Alto de Vilches.
3. Maule, Tregualemu (35°59'S, 72°48'W).
4. Ñuble, Recinto (36°48'S, 71°44'W)
5. Ñuble, Las Trancas, 21 km. E of Recinto, Cordillera Chillan.
6. Ñuble, Las Cabras, south of Volcán Chillan (36°54'S, 71°18'W); also "Shangri-la" on the southwest side of Volcán Chillan.
7. Arauco, Caramávida (37°41'S, 73°21'W); also San Alfonso, above Caramávida.
- 7a. Arauco, Elicura, Contulmo.
8. Malleco, Nahuelbuta National Park (37°48'S, 73°04'W).
9. Malleco, Contulmo National Park (38°00'S, 73°14'W).
- 9a. Malleco, Lonquimay. Icalma (38°49'S, 71°17'W).
10. Cautín, Fundo el Coigue, approx. 29 km. NE of Villarica.
11. Valdivia, Rincon de Piedra, approx. 20 km. SE of Valdivia.
12. Neuquén, Pucará Forestry Station (Estacion Forestal), Lanín National Park; also Río Nonthue, Estacion Forestal Pucará; also Lago Nonthue.
13. Neuquén, 5 km. SE of Lago Huechulafquén (lake is at 39°46'S, 71°28'W).
14. Neuquén, San Martin de los Andes (town, 40°18'S, 71°23'W); also Arroyo Culebra, 20 km. S of San Martin; Arroyo Rosales, near San Martin; Yuco, west of San Martin.
15. Osorno, Río Golgol, Cordillera Osorno (40°39'S, 72°21'W).
16. Osorno, Puyehue National Park.
17. Osorno, Paso Puyehue, Puyehue National Park.
18. Neuquén, Lake Correntoso.
19. Neuquén, Villa La Angostura (40°47'S, 71°40'W) vicinity, including Los Totoros and Río Totoral, 23 and 24 km. NW of Villa La Angostura, and Río Bonito, SE of town.
20. Llanquihue, Hornohuincó, 11 km. SW of Lago Chapo.
21. Río Negro, Lago Gutierrez (41°15'S, 71°24'W).
22. Río Negro, San Carlos de Bariloche (Bariloche in Kimmins, 1929).
23. Río Negro, 5 km. S of Río Villegas (41°34'S, 71°32'W).
24. Chiloe, Isla Chiloe, Dalcahue; also Río Butalcura, northwest of Dalcahue.
25. Chiloe, Isla Chiloe, Castro; also Piruquina (42°24'S, 73°48'W).
26. Chiloe, Isla Chiloe, Ahoni Alto, SE of Conchi; also Pio-Pio, 15 km. NW of Queilén.
27. Palena (formerly Chiloe), Termas Amarillo, about 30 km. SE of Chaitén.
28. Aysen (Aisen), Puerto Cisnes (44°45'S, 72°42'W) (not on map).
29. Magallanes, Tierra del Fuego, Rusfin (Rusfin) (53°32'S, 68°54'W) (not on map).

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